Anemia in the Elderly

Prevalence and Possible Treatment Guidelines
Definitions

Anemia is a condition of low hemoglobin concentrations caused by decreased production, increased loss, or destruction of RBCs.

The World health Organization (WHO) defines anemia as hemoglobin levels of less than 12 g/dl in women and less than 13 g/dl in men.
In a summary of 45 published studies the weighted mean prevalence of anemia in seniors (65 or >) was found to be:

- 12% (3-25%) of individuals in the home setting
  - > 3,000,000 in the US alone
- 23% to 48% of individuals with CHF and CKD
- 35% to 60% of individuals in the LTC setting
- 40% to 72% of individuals at time of hospital admission
- 90% of individuals in the ICU more than 3 days.
Chronic Anemia

- Anemia lasting < 90 days has no statistical impact on hospitalizations.

- Anemia lasting > 90 days increases your chances of being hospitalized by a factor of 1.9.

- Anemia lasting 1 year increases your chances of being hospitalized by a factor of 2.2.
Conditions that May Predispose to Anemia

- Cancer
- Chronic Inflammation
- GI Bleed (Crohn’s disease, ulcerative colitis, peptic ulcer disease)
- Endocrine disorders (diabetes, thyroid disease)
- Low dietary intake of iron, vitamin $\text{B}_{12}$, or folate
- Recent blood loss
- Renal Disease
- Use of drugs that can cause anemia
Hypoxia of Anemia

Why is even mild anemia so dangerous to the elderly?

> Almost all oxygen is carried on the Hgb molecule.

> Oxygen Content is calculated as:
  > Hgb x 1.36 x SaO2 + (0.0031 x PaO2)
  > Text book normal for arterial blood is 20 ml O2 per 100 ml blood
  > Text book normal for venous blood is 15 ml O2 per 100 ml blood

> Let's do some math
Hypoxia of anemia

- Arterial norm is 20 ml O2/100 ml blood
- Venous norm is 15 ml O2/100 ml blood

Normal 70 year old patient

> 15 x 1.36 x 0.95 = 19.4
> 14 x 1.36 x 0.95 = 18.0
> 13 x 1.36 x 0.95 = 16.8
> 12 x 1.36 x 0.95 = 15.5
> 11 x 1.36 x 0.95 = 14.2
> 10 x 1.36 x 0.95 = 12.9
Hypoxia of Anemia

- Arterial norm is 20 ml O2 / 100 ml blood
- Venous norm is 15 ml O2 / 100 ml blood

- 70 year old patient with COPD

- $15 \times 1.36 \times 0.90 = 18.4$
- $14 \times 1.36 \times 0.90 = 17.1$
- $13 \times 1.36 \times 0.90 = 16.0$
- $12 \times 1.36 \times 0.90 = 14.7$
- $11 \times 1.36 \times 0.90 = 13.4$
- $10 \times 1.36 \times 0.90 = 12.2$
Complications Associated with Anemia

- Cardiac complications
- Cognitive impairment
- Depression
- Increased mortality
- Decreased quality of life
- Negative impact on effectiveness on O2 therapy.
- Impaired physical performance
- Frailty
- Falls
Reducing Falls**

> In a recent study of 362 hospitalized ambulatory older adults, patients who fell were more likely to have low hemoglobin.
> ER/ICU LOS increased by a factor of 2X for patients who suffer a fall.
> 90% of hip fractures are due to falls and anemic patients are 3 times more likely to have a fall.
> Hip fractures are projected to increase to 6.3 million annually by 2050.
> For each 1% g/dl that hemoglobin increases, risk of fall goes down by 24%.

**Source Data: Study of Anemia in Long Term Care (SALT): Prevalence of anemia an its relationship with the risk of falls in nursing home residents. - PNSY
Reducing Falls***

> Fall rates for the Elderly average around 19% in the general community

> Fall rates for COPD patients are approximately 40%

> Fall rates for COPD patients on LTOT are approximately 70%

Source data: Falls in people with chronic pulmonary disease; an observational cohort study, Journal of Respiratory Medicine 2011 March; 105(3) 461-469
Discussion Points

- The mortality risk is 34% higher in CHF patients who also have anemia.

- Anemia is a marker for increased morbidity, hospitalizations, length of stay, mortality and health care costs.

- Prolonged anemia has been cited as a contributing factor in the development of left hypertrophy and other co-morbidities.

- O2 therapy is less impactful in patients with low hemoglobin because oxygen carrying capacity is diminished.
Discussion Points

> In 2012, over one million COPD patients experienced an acute exacerbation or issue that resulted in a hospitalization.

> Approximately 22% of these patients were readmitted within 30 days of hospital discharge.

> Would an RT driven protocol for managing the COPD patient at home have a direct impact on hospitalization rates?


National Quality Forum # 1891 October 6 2012
Anemia Treatment Regimens Can be Fast & Effective

> **Iron deficiency anemia**
  - Ferrous sulfate 325 mg once daily
  - Supplemental Dietary interventions

> **Vitamin B 12 deficiency anemia**
  - Vitamin B12 1,000 ug/ml deep SC or IM, weekly x 1 month then monthly
  - Dietary interventions

> **Folate deficiency anemia**
  - Folate 1 mg orally for 2-3 weeks, then reevaluate
  - Dietary interventions
Why is Anemia So Overlooked in Elderly Populations

- Poor Education concerning anemia
  - Anemia is not a normal part of aging. Clinicians, patients and family members need to know this.
  - Multiple large population studies are now out and gaining ground.

- Signs and Symptoms are generic:
  - Tiredness, fatigue, weakness, dizziness, SOB, depression
  - May also have pale skin, brittle nails, chest pain, cold hands and/or feet, or an irregular heart beat

- Until now the only definitive test was a painful and time consuming blood draw.
Discussion points

Would a simple non-invasive screening test for low hemoglobin allow clinicians to better identify patients at risk for anemia?

- Could this program increase Referrals to a Home Health Agency?
- Lead to additional therapies or cash pay supplemental nutrition?
- Improve Patient Care in a measurable way?
- Reduce transfers and re-hospitalizations?
- Improve ambulation, wound healing, and effectiveness of oxygen therapy?
Traditional Method: Blood Draw (ABG, CBC)

Lab Analysis Invasive, Delayed, Complex to Trend
New Solutions for On Site Hemoglobin Testing

Noninvasive, quick, and accurate spot-check testing offers the following benefits:

- **Clinician**
  - Provides instant feedback for immediate treatment decisions
  - Reduces need to wait for lab results

- **Staff**
  - Easy to use – reduces training time and improves efficiency
  - Decreases risk of accidental needle sticks and exposure to blood-borne pathogens
    - 600K to 800K needle stick injuries every year. - NIOSH data from Medline Website.
  - Requires no lab consumables or waste disposal

- **Patient**
  - Avoids painful needle sticks and time-consuming blood draws
  - Enables immediate face-to-face counseling with clinician
Pronto: Get Hemoglobin for the Price of a Hand Held Oximeter

**SpHb, SpO₂, and Pulse Rate**

> **Clinician**
>  - Facilitates timely assessment

> **Staff**
>  - Easy to use — reduces training time and improves efficiency
>  - Requires no lab consumables or waste disposal

> **Patient**
>  - Enables immediate face-to-face counseling with clinician

![Pronto Oximeter](image)

- >30 kg
- 10 – 50 kg

Reimbursable and CLIA Excluded

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## Pronto

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<tr>
<th>Features</th>
<th>Benefits</th>
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<tr>
<td>Low capital cost</td>
<td>Low barrier to entry</td>
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<tr>
<td>Average Test Time: 60 Seconds</td>
<td>Fast TAT</td>
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<td>SpHb, SpO2, Pulse Rate, Perfusion Index</td>
<td>More Complete Patient Information</td>
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<td>Masimo SET technology</td>
<td>Superior Spo2 Accuracy, Read thru Motion</td>
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<td>CLIA Excluded</td>
<td>Fewer Regulatory Requirements</td>
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<tr>
<td>Adult and Pediatric Sensor Options</td>
<td>More Accurate Results</td>
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<tr>
<td>200 test &amp; 400 test quantities</td>
<td>Price discounts for higher volumes</td>
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Clinical Evidence

Masimo is passionate about making innovative technologies that give clinicians the tools they need to do what is best for patient care. That’s why it is gratifying to see so many independent clinicians and clinical researchers take the time to independently evaluate our products and technologies—and then to communicate the positive impacts on patient care and safety that can be realized through their use.

More than 100 independent and objective studies by researchers around the world have demonstrated the clinical advantages of our technologies. These studies have shown Masimo technologies can provide a dramatic reduction in eye damage in the NICU, accurately measure ischemic patients at very low oxygen-saturation levels, and much, much more.

Featured Clinical Studies

- Impact of Continuous and Noninvasive Hemoglobin Monitoring on Intraoperative Blood Transfusions
- Impact of Pulse Oximetry Surveillance on Rescue Events and Intensive Care Unit Transfers
- Pieth Variability Index to Monitor the Respiratory Variations in the Pulse Oximeter Plethysmographic Waveform Amplitude and Predict Fluid Responsiveness in the Operating Theatre
- Goal-Directed Fluid Management Based on the Pulse Oximeter